

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Fuel Cells

10/2002



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STRATEGIC CENTER FOR NATURAL GAS WEBSITE

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DEVELOPMENT AND COMMERCIALIZATION OF 10 kW SOLID OXIDE FUEL CELL POWER SYSTEMS

Objective

The objective of the proposed program is to, within 10 years, develop a solid oxide fuel cell (SOFC) system, including stack and balance of plant, that has a factory cost of \$400/ kW_e or less, and that can be commercialized at the earliest possible date. Target markets for Cummins Power Generation (CPG) are recreational vehicles (RV's), commercial mobile (e.g. utility boom trucks), and telecom (remote or emergency power).

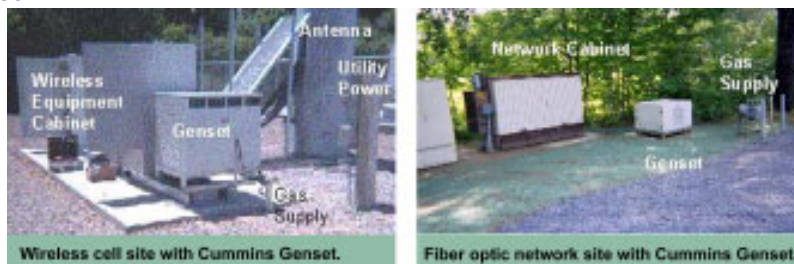
Recreational Vehicles



Commercial Mobile



Telecom



Project Summary

Cummins Power Generation
(Prime Contractor)

McDermott Technology, Inc.
— SOFCo
 (Cummins Sub-Contractor)

M/A-COM Ceram, Inc.
(McDermott Sub-Contractor)

Ceramatec, Inc.
(McDermott Sub-Contractor)

DOE Costs \$74,947,490

Prime Cost Sharing \$10,595,244

Partner Cost Sharing	\$64,879,948
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October 1, 2001 thru
January 2, 2011.

800-553-7681

Cummins Power Generation (CPG) and SOFCo, the SOFC unit of McDermott Technology, Inc. have teamed to develop a low cost, modular, high efficiency 10 kW SOFC power system suitable for CPG's markets. Activities in the program complement and accelerate SOFCo's existing SOFC development program and draw upon CPG's expertise in controls, power electronics, systems integration and packaging of power generation systems, and its strong position in the targeted consumer and commercial markets.

The 10kW SOFC power system will utilize unique multi-layer, co-fired planar SOFC stacks that are being developed by SOFCo. The SOFCo approach combines state-of-the-art SOFC materials with the manufacturing technology and infrastructure established for multi-layer ceramic (MLC) packages used in the microelectronics industry. The cell and interconnect components are both made using traditional tape casting, punching, screen printing, lamination and co-firing operations. As a result, this approach will enable high-volume, low-cost manufacturing of standardized high-performance SOFC stacks.

The program consists of three phases. Phase I, to be completed in four years, includes system design and engineering, component design and development, SOFC materials and stack development, and construction of a prototype system to demonstrate satisfaction of program cost and performance objectives. The three-year Phase II culminates in demonstration of a prototype meeting commercial and program objectives at a cost level that will satisfy premium or specialized market segments. Phase III covers three years and develops the SOFC power system performance and cost to mainstream commercial levels and introduces it as a supported value package to the target markets.

Cost reduction will be a major emphasis in the program. At the conclusion of Phase III, the factory cost of a 10 kW system is targeted at \$400/kW, which is competitive with current reciprocating engine systems in this size range. Meeting this cost target is expected to result in a significant replacement of reciprocating engine technology in existing generator set markets and result in a production base sufficient to support the required program investments. The modular nature of SOFC systems will permit rapid scale-up in system sizes from 10kW to 250kW and beyond.

The development is targeted at specific markets currently served by CPG. Because CPG maintains a market leadership in the markets described above, the new products can be readily deployed as soon as they are available, resulting in rapid commercialization.

Phase I Project Schedule Milestones

